

annual precipitation at that place, from January, 1880, to April, 1897, both inclusive. The station is located at N. 11° 26', W. 85° 47'; elevation, 210 feet.

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
1880...	0.00	0.00	0.00	0.00	10.23	12.58	3.62	10.48	7.95	13.83	5.02	0.67	64.38
1881...	0.00	0.00	0.00	0.00	5.20	13.17	8.88	6.96	7.42	24.67	10.88	1.91	79.21
1882...	0.00	0.13	0.00	0.00	4.26	9.80	4.04	6.25	7.65	23.38	4.20	1.61	61.32
1883...	0.28	0.00	0.00	0.14	1.00	8.07	4.87	4.34	5.78	18.25	5.70	1.34	49.77
1884...	0.59	0.09	0.00	2.03	2.80	10.43	4.98	3.84	4.48	15.83	7.43	2.24	54.74
1885...	0.04	0.00	0.00	0.00	1.73	7.27	4.81	2.76	5.40	7.88	4.36	0.29	34.59
1886...	0.23	0.20	0.00	17.00	7.87	15.00	20.80	15.30	10.40	8.75	0.29	87.21	
1887...	0.90	0.81	0.00	0.00	9.17	8.18	4.10	5.03	19.42	22.47	2.50	2.31	74.89
1888...	1.33	0.04	0.00	0.00	7.12	8.50	4.18	5.00	9.80	16.80	1.11	1.13	55.51
1889...	0.00	0.19	0.07	1.71	11.34	11.64	7.48	12.95	9.80	24.13	3.88	1.67	84.36
1890...	0.49	0.11	0.94	0.00	2.63	4.56	4.73	3.78	2.77	9.68	1.30	0.82	31.81
1891...	0.00	0.00	0.00	0.78	0.75	24.58	4.38	4.21	12.42	14.90	2.34	1.67	66.03
1892...	0.19	0.00	0.00	0.00	13.30	9.80	9.19	7.48	12.22	21.26	4.40	0.43	78.27
1893...	0.06	0.39	0.00	0.11	20.03	21.14	13.22	18.70	14.00	13.56	1.44	2.48	105.13
1894...	2.12	2.36	0.08	0.00	7.76	6.32	3.64	4.57	4.33	14.62	3.21	0.43	49.44
1895...	0.00	0.08	0.19	0.39	8.11	1.10	5.25	3.42	8.01	8.97	2.04	0.20	50.56
1896...	0.40	0.08	0.00	T.	3.26	6.23	7.43	6.57	7.40	7.42	8.62	0.39	47.80
1897...	0.33	T.	1.04	0.00	21.30	24.34	6.41	12.10	17.63	33.85	5.15	1.28	123.43
1898...	1.07	0.12	0.10	0.00	16.17	18.95	13.65	.....	.....	.....	.....	.....	.....
Means.	0.45	0.24	0.30	0.29	8.38	11.20	6.88	7.94	9.54	17.38	4.27	1.19	67.56

RAINFALL IN NICARAGUA.

By A. J. HENRY, Chief of Division.

As supplementary to the record of rainfall by Mr. William Cline at Masaya and Granada, in Nicaragua, published on page 162 of the MONTHLY WEATHER REVIEW for April, 1898, and the table by Dr. Earl Flint at Rivas, Nicaragua, on page 305 of the current number of the REVIEW for July, the following statistics given for other places have been collected from the respective publications, and are reprinted for convenience of reference:

(1) GRANADA.

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
1876...	.....	.....	.....	.....	5.77	13.65	26.61	4.96	.....	.....	.....	.....	.....
1877...	0.00	0.00	0.00	0.00	11.57	10.24	10.12	5.82	17.36	5.27	0.87	0.59	61.34

(2) GRANADA.

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
1883...	0.35	0.00	0.00	0.18	0.28	5.20	2.66	5.47	9.74	19.91	3.64	0.00	47.43
1884...	0.00	0.00	0.00	0.00	0.00	8.25	3.99	3.75	8.82	8.63	2.28	0.26	35.98

(3) BLUEFIELDS.

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
1883...	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1884...	10.25	6.39	3.21	2.06	2.67	8.01	17.06	16.40	5.82	4.99	9.71	11.15	97.72
1885...	1.96	1.60	2.68	2.87	5.89	13.37	19.82	11.75	8.07	2.69	7.70	3.15	81.53
1886...	7.28	*3.94	1.63	.....	.....	.....	8.55	.....	.....	.....	.....	.....	.....

* For twenty-four days only.

(4) GREYTOWN.

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
1890...	26.80	6.36	5.93	18.11	4.93	46.84	52.55	35.72	8.14	24.36	25.55	41.65	296.94
1891...	20.30	2.57	1.35	10.40	13.78	26.95	23.57	19.49	14.16	20.21	23.15	32.74	214.27
1892...	28.57	11.38	4.36	18.38	50.88	13.42	33.96	23.63	11.47	27.95	36.98	24.65	291.20
1893...	17.70	7.53	3.93	9.99	2.77	.....	.....	.....	.....	.....	.....	.....	.....

(1) *Granada*.—Observations made in 1876 by Ramon Espinola; in 1877 by Earl Flint; from unpublished manuscripts in Weather Bureau. Location, N. 11° 56'; W. 85° 54'; elevation, 218 feet.

(2) *Granada*.—Observations made at the National Institute. Location, N. 11° 56'; W. 85° 54'; elevation, 230 feet. Reported in Senate Ex. Doc. No. 99, Forty-ninth Congress, first session.

(3) *Bluefields*.—Observations by Hon. W. H. Jackson and others. Published in the International Bulletin of the Signal Service. Location, N. 12° 00'; W. 83° 43'; elevation, — feet.

(4) *Greytown*.—Observations made under the direction of Dr. J. E. Stubbart, of the Nicaragua Canal Company. Location, N. 10° 59'; W. 83° 42'; elevation, — feet. Reported in Senate Ex. Doc. No. 74, Fifty-third Congress, second session, pp. 54–55.

According to the report of the United States Nicaragua surveying party for 1895, by A. G. Menocal, Civil Engineer, U. S. N. (Forty-ninth Congress, first session, Senate Ex. Doc. No. 99, p. 36), Col. O. W. Childs, an American engineer, made the first careful survey for a canal by this route in 1850–51. His meteorological records were taken at Rivas from September 7, 1850 to March 11, 1851, and in the valley of the San Juan River, from the latter date to September 25, 1851.

Commander E. P. Lull, U. S. N., in charge of the United States Survey expedition of 1872–73 (see — Congress, — session —), obtained a meteorological record from July 1, 1872 to March 14, 1873, at Virgin Bay, 4 miles south of Rivas.

The National Institute of Granada established a well conducted system of meteorological observations in 1880 at Granada (N. 11° 56', W. 85° 51'; elevation, 229.6 feet). The monthly means for 1883 and 1884 are given by Menocal in his report of 1885, in lieu of any special observations by his own survey party, which left Washington December 17, 1884, beginning operations in Nicaragua on January 22, and leaving that country May 12, 1885. This record as published by him is as follows (the thousandths have been omitted from the rainfall):

RAINFALL.

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
1883...	0.35	0.00	0.00	0.20	0.28	5.20	2.66	5.47	9.74	19.91	3.64	0.00	47.44
1884...	0.00	0.00	0.00	0.00	0.00	8.25	3.99	3.75	8.82	8.63	2.28	0.26	35.98

NUMBER OF RAINY DAYS.

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
1884...	0	0	0	0	0	10	12	9	16	17	8	2	74

WIND.

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
1883...	NE.	E.	E.	E.	E.	E.	SE.	E.	E.	NE.	NE.	N.	E.
1884...	SE.	E.	SE.	NE.	NE.	E.	E.	E.	E.	SW.	SE.	NE.	E.

MAXIMUM TEMPERATURE.

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
1883...	88.5	88.0	89.0	91.0	93.0	91.0	89.5	89.5	89.5	88.0	88.0	88.0	89.4
1884...	86.0	87.0	89.0	91.5	91.5	91.5	90.5	90.5	89.5	89.5	89.5	87.0	89.4

MINIMUM TEMPERATURE.

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
1883...	70.0	69.0	71.5	75.0	73.5	78.0	71.5	68.0	71.5	70.0	68.0	66.0	71.0
1884...	70.0	66.0	65.0	71.5	73.5	70.0	71.0	68.0	68.0	68.0	69.0	68.0	69.0

MEAN TEMPERATURE.

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
1883...	81.0	82.0	82.5	83.0	84.0	82.5	81.5	81.0	80.0	79.0	77.5	75.0	80.8
1884...	80.0	80.0	81.0	82.0	81.0	80.5	81.0	83.5	82.5	79.0	82.0	80.0	81.0

MEAN BAROMETER.

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
1883...	29.70	.66	.74	.70	.66	.63	.63	.68	.60	.68	.67	.67	29.67
1884...	29.65	.64	.60	.64	.64	.61	.61	.58	.56	.62	.64	.65	29.62

RAINFALL OF MASAYA AND GRANADA, NICARAGUA.¹

By A. J. HENRY, Chief of Division.

Dr. Earl Flint, for many years voluntary observer of the Smithsonian Institution and the Signal Service, and the present correspondent of the Weather Bureau for Rivas, Nicaragua, furnishes the following table of rainfall, as observed by Mr. Cline.

Masaya is in latitude 12° 2' N., longitude 86° W.; Granada is in latitude 12° N., longitude 85° 56' W. Observations were made by Mr. William Cline, civil engineer, at Masaya,

¹ Reprinted from the April Review.

from 1886 to 1896, and at Granada for the remainder of the time. Nothing is known of the kind of gauge used or its exposure, but from the professional standing of the observer and the general agreement between the recorded amounts and those obtained by Dr. Flint at Rivas (latitude $11^{\circ} 26' N.$, longitude $85^{\circ} 47' W.$, elevation, 200 feet above sea level), it is concluded that the series is reliable.

The rainy season at Masaya, as elsewhere in Nicaragua, begins in May and ends in the latter part of October. December, January, February, and March are almost destitute of rain, less than 2 per cent of the annual fall occurring in those months.

The greatest fall in any year was at Granada, in 1897 93.62 inches, or 162 per cent of the mean fall; the least fall of any year was at Masaya, in 1890, 20.52 inches, but 35 per cent of the mean fall. Such a disproportion between the amount of rain in the year of minimum rainfall and the mean is rarely observed. The variation in the fall of the same month in different years is even greater. The short dry season in the middle of summer, which is a characteristic of the rainfall of portions of Central America, is not well marked at Masaya; in some years heavy rain is continuous from May to November.

Monthly and annual amounts of rainfall at Masaya, 1886-1896, and Granada, 1897, Nicaragua, in inches and hundredths.

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
1886 ...	.....	.....	.....	*	.....	.....	8.23	15.36	15.34	11.19	0.69	0.02	*72.70
1887 ...	0.30	0.00	0.00	0.00	2.42	10.73	7.39	5.74	9.15	23.56	0.94	0.99	61.22
1888 ...	0.05	0.14	0.00	0.00	7.09	12.09	4.95	9.50	17.21	7.67	0.00	0.00	58.70
1889 ...	0.00	0.00	0.39	1.18	6.43	17.00	7.87	13.43	14.53	13.36	2.34	0.25	78.78
1890 ...	0.14	0.00	0.00	0.60	1.32	3.00	2.86	2.65	2.95	5.89	0.42	0.18	20.52
1891 ...	0.19	0.00	0.00	1.02	0.48	20.94	4.52	4.20	10.40	5.45	2.78	0.00	49.98
1892 ...	0.00	0.00	0.00	0.00	7.36	14.42	8.70	6.75	9.64	15.71	1.66	0.30	64.54
1893 ...	0.00	1.15	0.00	0.00	9.26	11.78	11.47	15.82	12.67	6.51	2.70	1.50	72.86
1894 ...	0.32	0.50	0.00	0.00	7.87	4.77	3.32	4.00	7.49	18.42	1.08	0.11	42.88
1895 ...	0.00	0.00	0.00	0.41	4.57	4.71	5.22	2.90	8.36	14.46	0.57	0.06	41.26
1896 ...	0.23	0.00	0.00	0.09	5.62	7.90	7.13	2.98	6.62	4.22	4.85	0.00	39.64
1897 ...	0.00	0.00	0.97	1.77	16.63	30.79	8.88	10.87	10.21	11.97	1.25	0.28	93.62
Means	0.11	0.16	0.31	0.46	6.32	12.56	6.71	7.84	10.38	11.12	1.61	0.31	57.89

*The estimated rainfall January to June, 1886, inclusive, was 21.97.

THE CHARACTER OF THE EVENING.

By P. CONNOR, Local Forecast Official (dated Kansas City, Mo., August 16, 1898).

Referring to the remarks of Mr. Lee A. Denison, observer, Weather Bureau, on page 215 of MONTHLY WEATHER REVIEW for May, 1898, and commended by the Editor, in regard to stations keeping a record to show the "Character of the Evening" (to include the hours from twilight to midnight) for use in court, I beg permission to state that, according to my experience with lawyers and as a witness producing the Weather Bureau records in court, such a record as that suggested would be thrown out as "incompetent testimony," unless the cause of the litigation involved the entire period mentioned, that is, from twilight to midnight, which it rarely does. The act, whatever it may have been, is as a rule, located "at or about" a certain time. The records will show an average condition for a much longer period, but nothing definite at the time of occurrence. The lawyer on the opposing side will make the person having the records in court confess that he does not know, and that the records do not show whether or not it was light or dark at a certain time; that it could have been either at the time in question and yet make the average shown by the records. Anybody who has had much court experience knows that such testimony would be thrown out. Kansas City records had been called into court 31 times during the year ending June 30 last, so that we have some idea of the exactions of lawyers and the rulings of judges.

METEOROLOGY AT JOHNS HOPKINS UNIVERSITY.

By O. L. FASSIG, Observer, Weather Bureau (dated July 26, 1898).

In 1897 the University authorities, through the efforts of Prof. Wm. B. Clark, provided for regular and permanent instruction in climatology in connection with the course for graduate students in the Department of Geology. Instruction in this branch is now required of all candidates for the doctor's degree taking geology as a major study.

The first instruction in the course was given by me in the fall of 1898, and consisted of a series of twelve lectures. A list of the lectures as delivered is submitted herewith. The purpose of this series was to present to the students, as clearly as was possible for me within the narrow limits prescribed, the principles underlying the science of climatology, and the practical results achieved by the study of statistical climatology. Two lectures per week were given during October and November. The class comprised fifteen students, an unusually large number for a class composed entirely of advanced students. As many of these students are preparing themselves for the profession of teaching in the higher schools and universities of the land it is especially desirable to reach this class in order to promote an interest in favor of meteorology in our educational institutions.

During the month of May the instruction by lectures was supplemented by a practical course for two weeks in the use of meteorological instruments. To the usual course of instruction in the lecture room and in the laboratory, Professor Clark this year added a practical course in field work for his advanced students in geology. The work of the University was transferred to the field. For a period of two weeks the students were encamped in the Allegheny Mountains near Cumberland, Md., and under the guidance of specialists, devoted themselves to the study of nature at first hand. Through the courtesy of the Chief of the Weather Bureau the camp was provided with a complete outfit of meteorological instruments, and the undersigned was granted official time for the duties of instructor in camp. The students were put through the daily routine of an observer, and informal talks were given about meteorological instruments and about weather forecasting. Nearly all of the students in camp availed themselves of the opportunity thus offered to become familiar with the instruments and their method of exposure.

The course of instruction planned for the coming college year is along the same lines as that of the past year, but the lectures are increased in number from twelve to twenty, thus giving me an opportunity to go more into detail and to draw more largely from the rich statistical material of the United States Weather Bureau.

In this connection permit me to mention that much time and labor have been spent in preparing the notes of this lecture course, so that they might readily be utilized in giving a similar course at one or more of the large universities, should such a policy be deemed advisable in order to promote in University circles a more general interest in meteorology and climatology.

MEXICAN CLIMATOLOGICAL DATA.

Through the kind cooperation of Señor Mariano Bárcena, Director, and Señor José Zendejas, vice-director, of the Central Meteorologico-Magnetic Observatory, the monthly summaries of Mexican data are now communicated in manuscript, in advance of their publication in the *Boletín Mensual*; an abstract translated into English measures is here given in continuation of the similar tables published in the MONTHLY WEATHER REVIEW since 1896. The barometric means have not been reduced to standard gravity, but this correction will be given at some future date when the pressures are published on our Chart IV.